

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

HUTT CITY COUNCIL AND GENESIS
ENERGY LIMITED

Prepared by: Bernie Cross

Date audit commenced: 31 January 2023

Date audit report completed: 31 March 2023

Audit report due date: 20 March 2023

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EXECUTIVE SUMMARY

This audit of the **Hutt City Council (HCC)** DUMML database and processes was conducted at the request of **Genesis Energy Limited (Genesis)** in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUMML audits version 1.1. The scope of the audit encompasses the collection, security, and accuracy of the data, including the preparation of submission information.

As reported in the last audit, the streetlight information is recorded in an ArcGIS database managed by HCC. There is a separate RAMM database and HCC intends to migrate from ArcGIS to RAMM as part of its programme of improvements to the streetlight asset management processes. The project remains in the planning stage and is still tentatively expected to be completed by 31 August 2023.

New connection, fault and maintenance work is largely completed by Fulton Hogan, with some work completed by McKay's and City Electricians as subcontractors. Commercial Signals are responsible for festive lights, outage patrols, some complex work, and confirming new streetlight connections match to the as-builts. All of the contractors record the details of the work completed in the field, which is manually input into the database by their office staff on receipt. HCC completes audits to spot check data that the contractors have entered and monitors activity to ensure that updates are occurring.

Genesis reconciles the DUMML load as NHH using the CST profile, with wattages derived from the most recent database extract provided by HCC and on and off times derived from data logger information.

The power summary monthly report provided to Genesis Energy is missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh per annum.

A field audit was conducted of a statistical sample of 386 items of load and results were analysed using the "database auditing tool". I found that the database had poor accuracy, demonstrated with statistical significance. The true wattage (installed in the field) could be between 11.4% lower and 9.9% higher than the wattage recorded in the DUMML database. This is outside of the allowable +/- 5% threshold. There is a 95% level of confidence that the annual consumption is between 513,000 kWh p.a. lower to 445,100 kWh p.a. higher than the database indicates.

The audit found five non-compliances and four recommendations were made.

The future risk rating of 36 indicates that the next audit be completed in three months. I recommend that the next audit be in no more than six months' time. This should allow Hutt City Council sufficient time to complete the proposed migration of the DUMML database from ArcGIS to RAMM and for the recommended actions to be in progress to improve the overall database accuracy.

The matters raised are detailed in the table below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>The database is not accurate within \pm 5%. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage for all lights connected to the listed pole.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not</p>	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>included in the January 2023 database extract provided to Genesis.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>				
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	<p>LED make and model details are not recorded in the database.</p> <p>85 items of load do not have information populated in the light model fields, and 32 of these also have no information populated in the "If Other Light Type Pls Specify" field.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p>	Weak	Medium	6	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	<p>Three additional lights found in the field.</p>	Weak	Low	3	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light</p>	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p> <p>Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>				
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>The database is not accurate within \pm 5%. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p>	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p> <p>Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>				
Future Risk Rating						36	

Future risk rating	0	1-4	5-8	9-15	16-18	19+
Indicative audit frequency	36 months	24 months	18 months	12 months	6 months	3 months

RECOMMENDATIONS

Subject	Section	Recommendation
ICP identifier and items of load	2.2	Liaise with Wellington Electricity to create separate ICPs for any private lights prior to these being excluded from HCC DUMML Database.
DUMML database for Properties UrbanPlus.	2.2	Create a separate DUMML database and ICPs to reconcile this load.
Review new connection process.	3.1	Genesis Energy and Hutt City Council to review the new connection/livening request process to ensure any private lights are not lived until a responsible party is identified for these lights.
Festive Lights	3.1	Complete a full stocktake of installed festive lights and confirm processes to communicate festive light wattages and on and off dates to Genesis so that they can be included in submission data when connected.

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit observation

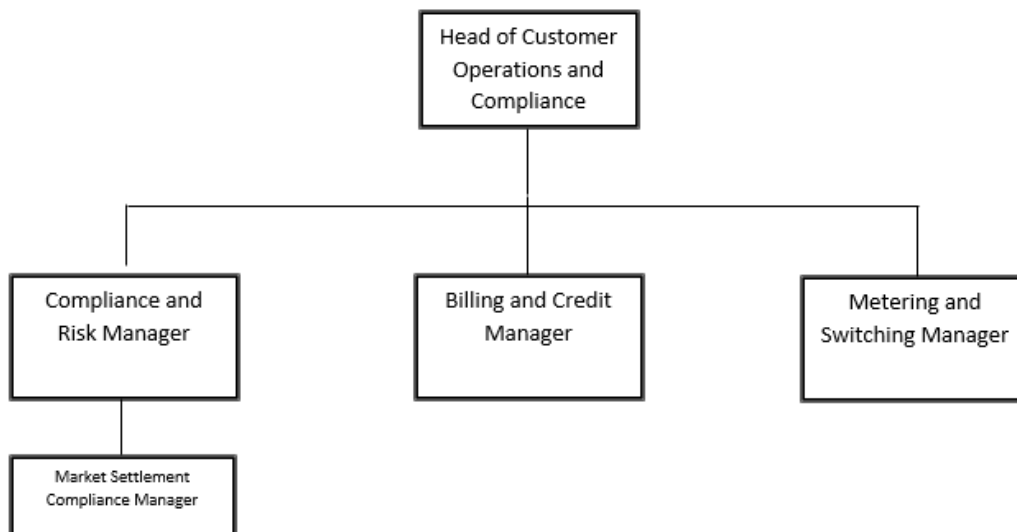
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

There are no exemptions relevant to the scope of this audit.

1.2. Structure of Organisation

Genesis provided a copy of their organisational structure.



1.3. Persons involved in this audit

Auditors:

Name	Title	Company
Bernie Cross	Auditor	Veritek Limited

Other personnel assisting in this audit were:

Name	Title	Company
Andrew Rowe	Traffic Asset Lead	Hutt City Council
Nirav Teli	DUML Data & Stakeholder Lead	Genesis Energy

1.4. Hardware and Software

HCC's ArcGIS is used to record streetlight information. The database is backed up, and access is secure by way of password protection.

Systems used by the trader to calculate submissions are assessed as part of their reconciliation participant audits.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

ICP Number	Description	NSP	Participant code	Profile	Number of items of load	Database wattage (watts)
0001255305UNA9F	MASTER ICP HCC STREETLIGHT MLG0111	MLG0111	GENE	CST	2,854	223,360.5
0001256863UN50E	MASTER ICP HCC STREETLIGHT MLG0331	MLG0331	GENE	CST	5,203	374,866.5
0001256864UN8C4	MASTER ICP HCC STREETLIGHT GFD0331	GFD0331	GENE	CST	5,232	419,781.4
0001256868UNBDA	MASTER ICP HCC STREETLIGHT HAY0111	HAY0111	GENE	CST	1,630	97,999
Total					14,919	1,116,007.4

1.7. Authorisation Received

All information was provided directly by Genesis or HCC.

1.8. Scope of Audit

This audit of the HCC DUML database and processes was conducted at the request of Genesis in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied. The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

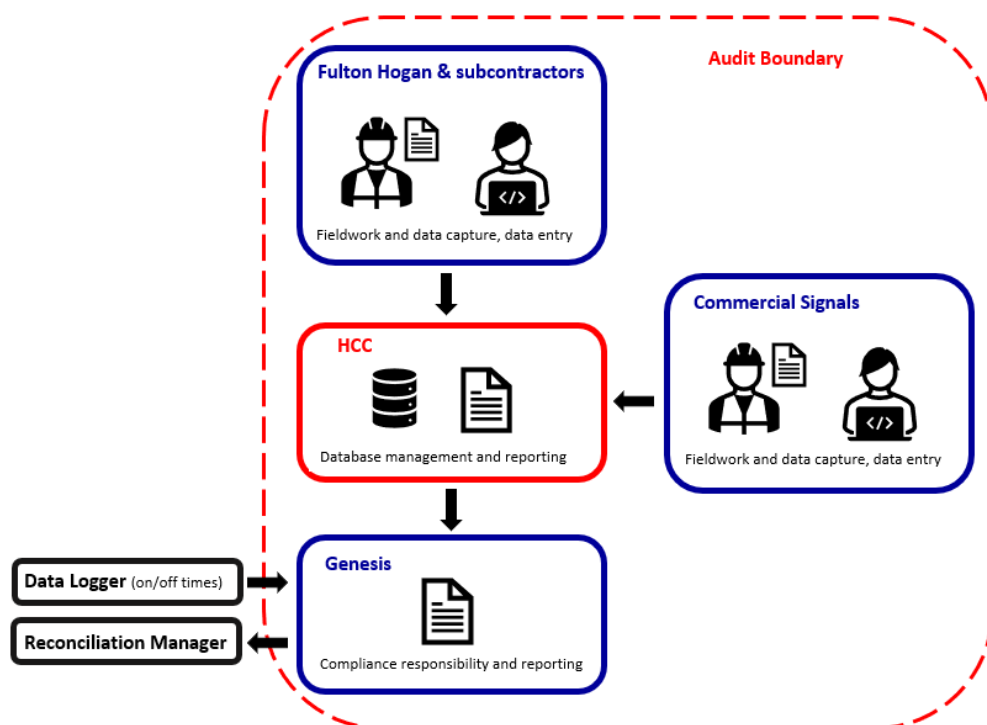
Streetlight information is recorded in an ArcGIS database managed by HCC. There is a separate RAMM database and HCC intends to migrate from ArcGIS to RAMM as part of its programme of improvements to streetlight asset management processes. The project is still in the planning stage and is tentatively expected to be completed by 31 August 2023.

New connection, fault and maintenance work is completed by Fulton Hogan, with some work completed by McKay's and City Electricians as subcontractors. Commercial Signals are responsible for festive lights, outage patrols, some complex work, and confirming new streetlight connections match to the as-builts. All of the contractors record the details of the work completed in the field, which is manually input into the database by their office staff on receipt. HCC completes audits to spot check data that the contractors have entered, and monitors activity to ensure that updates are occurring. HCC currently only has read only access to the ArcGIS database and does not perform any updates directly to the database.

HCC provides a monthly report from the ArcGIS database to Genesis.

Genesis reconciles the DUML load as NHH using the CST profile, with wattages derived from the most recent database extract provided by HCC and on and off times derived from data logger information.

The scope of the audit encompasses the collection, security, and accuracy of the data, including the preparation of submission information based on the database reporting. The diagram below shows the audit boundary for clarity.



The field audit was undertaken of a statistical sample of 386 items of load on 7th February 2023 & 1st March 2023.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Rebecca Elliot of Veritek Limited in September 2022. The summary table below shows the statuses of the non-compliances and recommendations raised in the previous audit. Further comment is made in the relevant sections of this report.

Table of Non-compliance

Subject	Section	Clause	Non-compliance	Status
Distributed unmetered load audits	1.10	16A.26 and 17.295F	The audit was not completed by the due date.	Cleared
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 198,000 to 1,117,700 kWh p.a. lower than the database indicates.</p> <p>Database extracts have not consistently been provided to Genesis monthly; or included wattage information.</p> <p>Some submission volumes for September 2021 and July 2022 were not consistent with the expected values based on the database extract and logger hours.</p> <p>44 items of load totalling 2,561 W have "Properties UrbanPlus" recorded in the ICP number field and are excluded from submissions.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>22 poles had a zero-gear wattage when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis.</p> <p>Under submission is expected as festive lights wattages were not included in the January 2022 database extract provided to Genesis.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the</p>	Still existing

Subject	Section	Clause	Non-compliance	Status
			pole rather than the light where more than one light is connected.	
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	44 items of load totalling 2,561 W have "Properties UrbanPlus" recorded in the ICP number field.	Cleared
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	LED make and model details are not recorded in the database. 85 items of load do not have information populated in the light model fields, and 32 of these also have no information populated in the "If Other Light Type Pls Specify" field. 22 poles had a zero-gear wattage when a non-zero value was expected.	Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Two additional lights found in the field.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 198,000 to 1,117,700 kWh p.a. lower than the database indicates. Database extracts have not consistently been provided to Genesis monthly; or included wattage information. Some submission volumes for September 2021 and July 2022 were not consistent with the expected values based on the database extract and logger hours. 44 items of load totalling 2,561 W have "Properties UrbanPlus" recorded in the ICP number field and are excluded from submissions. LED light descriptions do not contain lamp make and model so correct wattage cannot be verified. Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models. Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage. 85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description. 22 poles had a zero-gear wattage when a non-zero value was expected. There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2022 database extract provided to Genesis.	Still existing

Subject	Section	Clause	Non-compliance	Status
			Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.	
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 198,000 to 1,117,700 kWh p.a. lower than the database indicates.</p> <p>Database extracts have not consistently been provided to Genesis monthly; or included wattage information.</p> <p>Some submission volumes for September 2021 and July 2022 were not consistent with the expected values based on the database extract and logger hours.</p> <p>44 items of load totalling 2,561 W have "Properties UrbanPlus" recorded in the ICP number field and are excluded from submissions.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description. 22 poles had a zero-gear wattage when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2022 database extract provided to Genesis.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>	Still existing

Table of Recommendations

Subject	Section	Recommendation	Status
ICP Identifier	2.2	Liaise with Wellington Electricity and Property UrbanPlus to create separate ICPs for these items of load.	Still existing
Database accuracy	3.1	Confirm processes to communicate festive light wattages and on and off dates to Genesis so that they can be included in submission data when connected.	Still existing
		Liaise with HCC and Wellington Electricity to confirm correct owner of private lights.	Still existing

1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

- 1. by 1 June 2018 (for DUML that existed prior to 1 June 2017)*
- 2. within three months of submission to the reconciliation manager (for new DUML)*
- 3. within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Genesis have requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database.

Audit outcome

Compliant

2. DUMML DATABASE REQUIREMENTS

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

- DUMML database is up to date,
- methodology for deriving submission information complies with Schedule 15.5.

Audit observation

The process for calculation of consumption was examined and the application of profiles was checked. The database was checked for accuracy.

Audit commentary

Genesis reconciles the DUMML load as NHH using the CST profile.

- Wattages are derived from an extract from the ArcGIS database provided by HCC. Database extracts are supplied to Genesis monthly. The best available estimate indicates that the database is not accurate within $\pm 5\%$ as discussed in **section 3.1**.
- On and off times are derived from data logger information.

I recalculated the submissions for November 2022 using the data logger and the database information. I confirmed that the calculation method was correct.

I compared the submitted volume for November 2022 to a manual calculation of the watts of connected load from the November 2022 database extract and the operation hours of the streetlights from the streetlight logger for November 2022 and found some differences as detailed in the table below:

ICP	Nov 2022 GENE kW	Burn hours	Nov 2022 kWh submitted	DUMML DB kW	Calculated kWh	Difference
0001256864UN8C4	415.1942	284.73	118,217.4	419.781	119,524.36	-1,306.96
0001256868UNBDA	97.897	284.73	27,874.2	97.999	27,903.26	-29.06
0001255305UNA9F	221.3655	284.73	63,029.1	223.360	63,597.44	-568.34
0001256863UN50E	364.612	284.73	10,3815.3	374.866	106,735.74	-2,920.44

Genesis advised that submission differences sometimes occur where database information is received late. However, the differences involved in both overall lamp counts (14,919 DUMML DB vs 14,448 Power Summary report used by Genesis) indicates that there may be issues with how the data is being aggregated for use in the summary report provided by Hutt City Council to Genesis. Further investigation identified that the power summary monthly report provided to Genesis Energy is missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up. The annual impact of this mapping issue was assessed to be an estimated under submission of 56,683 kWh.

Examination of the database found:

Issue	Estimated volume information impact (annual kWh)
LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.	Unknown impact
Where more than one light model field was populated, the lamp, gear and total wattage was expected to match the combined wattage for all light models recorded. I found that in most cases the wattages reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.	Unknown impact
Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage for all lights connected to the listed pole.	Unknown impact
85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.	Over submission of 1,926.2 kWh for the eight items of load where wattages were inconsistent with the "If Other Light Type Pls Specify" field. Unknown impact for the 35 items of load which had insufficient information to confirm the correct load.
<p>Festive lights are recorded in the database against 160 poles, 10 lights have a description that enables the operating wattage to be determined and 150 festive lights do not. In all cases these festive lights are recorded as secondary models connected to poles. It was also observed during the field audit that not all festive lights are recorded in the database.</p> <p>Most affected poles have 15-25 3W festive lamps fitted on a lighting harness. Commercial Signals connects the festive lights during November and disconnects during January.</p> <p>HCC is notified of the connection and disconnection dates, but there is not a process to communicate this to Genesis.</p>	Unknown impact, but under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.
29 poles had a zero-lamp wattage, Hutt City Council adds a placeholder record when a new light is to be installed and then updates the light model and wattage details once the light installation is completed. However, the most recent zero lamp wattage record in the database has a creation date of October 2021 indicating the process to monitor these light installations and make the necessary database updates is not robust	Unknown impact

The above discrepancies are discussed further in **sections 2.2, 2.4 and 3.1**.

As recorded in the last three audits, a monthly snapshot is not sufficient to calculate submission from, and the code requires that to calculate the correct monthly load the monthly wattage report must:

- take into account when each item of load was physically installed or removed, and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant. Genesis completes revision submissions where corrections are required and is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The ArcGIS database creates a single record for each pole and additional lights are recorded in fields labelled light 2, light 3 etc. Each record has a created date, installed date, end date, last edited date, last serviced date, lamp installation date, and pole installation date. Created date, installed date, end date and last edited date are all consistently populated. The lamp installation date is only populated for a small number of lamps. The “edited date” is automatically populated with the date the change occurred, and the “last serviced date” indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect. Because only one set of dates is recorded for each pole, where there is more than one light connected it may not reflect the correct dates for each light.

Lamp wattage, gear wattage and total wattage values are derived from the map model descriptions using a mapping table that requires maintenance outside of the database at the time the monthly snapshot is produced.

The design of the database provides a number of data integrity challenges to Hutt City Council to ensure data is complete and accurate each month.

Audit outcome

Non-compliant

Non-compliance	Description
<p>Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3</p>	<p>The database is not accurate within ± 5%. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage for all lights connected to the listed pole.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the “If Other Light Type Pls Specify” field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p>

From: 01-Sep-22 To: 28-Feb-23	<p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>Potential impact: High</p> <p>Actual impact: High</p> <p>Audit history: Multiple times</p> <p>Controls: Weak</p> <p>Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
High	<p>The controls over the database are rated as weak as the data quality is poor and incomplete. This is reflected by the field audit results.</p> <p>The audit risk rating is high based on kWh variances identified.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>HCC has been notified of the discrepancies. Genesis relies on HCC to accurately maintain its database.</p> <p>In regard to festive lights Genesis has advised Hutt CC to notify when the festive lights have been turned on/off.</p> <p>Genesis has advised Hutt CC that Genesis requires monthly extracts that track any changes within the month to meet the DUML regulations and track changes at a daily level.</p>		01/07/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Genesis will send monthly reminders to HCC to provide the dataset. Genesis will continue to work with the council to help them increase database accuracy.		Continuous Improvement	

2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)

Code reference

Clause 11(2)(a) and (aa) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *each ICP identifier for which the retailer is responsible for the DUML,*
- *the items of load associated with the ICP identifier.*

Audit observation

The database was checked to confirm an ICP was recorded against each item of load.

Audit commentary

All items of load have a valid ICP number recorded including 44 items of load totalling 2,561 W that were recorded with “Properties UrbanPlus” in the ICP number field in the last audit. These lights belong to an associated council organisation and were previously being excluded from submission data. The monthly database summary has been redesigned since the last audit as part of a transition of responsibility for the database between Hutt City Council personnel. The result of this redesign means these “Properties UrbanPlus” are currently being included in submission.

The redesign has also meant the Private lights and lights which are the responsibility of the Greater Wellington Regional Council, are also being included in the Hutt City Council monthly database extract to Genesis Energy.

The Hutt City Council is now reviewing the redesigned monthly extract to ensure only the lights where Hutt City Council is responsible are included in the extract.

I recommend that before any lights are excluded from the monthly database extract that Hutt City Council liaises with Genesis Energy and Wellington Electricity so that where additional ICPs are required to be created and UML load transferred to these new ICPs, that this effort is conducted in a coordinated way between the affected parties.

Hutt City Council has previously advised that Properties UrbanPlus belongs to an associated council organisation. I have repeated the previous audit recommendation to create a separate database and ICPs to reconcile this load.

HCC have advised that RAMM will allow a separate database to be created for this load. HCC intends to migrate from using the ArcGIS to RAMM as part of its programme of improvements to streetlight asset management processes. The project is still in the planning stage and is tentatively expected to be completed by 31 August 2023.

Description	Recommendation	Audited party comment	Remedial action
ICP identifier.	Liaise with Wellington Electricity to create separate ICPs for any private lights prior to these being excluded from HCC DUML Database.	Genesis has brought to the attention of HCC. Once they have a policy in place and advise their intention Genesis will discuss it further. Currently HCC council has advised private lights are marked on the map/database to let the contractors know not to work on them.	Identified
DUML database for Properties UrbanPlus.	Create a separate DUML database and ICPs to reconcile this load.	Genesis has advised HCC of auditor’s recommendation and will discuss further with them.	Identified

Audit outcome

Compliant

2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

The DUML database must contain the location of each DUML item.

Audit observation

The database was checked to confirm the location is recorded for all items of load.

Audit commentary

Global Positioning System (GPS) coordinates and location IDs are recorded for all items of load and users in the office and field can view these locations on a mapping system.

The database also contains the nearest property address for 13,352 of the 14,126 items of load in the database.

Audit outcome

Compliant

2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)

Code reference

Clause 11(2)(c) and (d) of Schedule 15.3

Code related audit information

The DUML database must contain:

- a description of load type for each item of load and any assumptions regarding the capacity
- the capacity of each item in watts.

Audit observation

The database was checked to confirm that:

- it contained a field for light type and wattage capacity,
- wattage capacities include any ballast or gear wattage, and
- each item of load has a light type, light wattage, and gear wattage recorded.

Audit commentary

The database contains six light model fields to record each light model connected to the pole. 85 of the 6,911 poles did not have any light model information populated in any of the six fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field. The accuracy of this information is discussed in **section 3.1**, as this section only covers completeness of information.

LED light models are generally recorded with a light model of "LED XXXW – LED", and no lamp make, or model is recorded. This makes it difficult to determine whether the correct wattage is being applied.

All 6,911 poles had a lamp wattage, gear wattage and total wattage populated. No poles had a blank lamp or gear wattage.

29 poles had a zero-lamp wattage, Hutt City Council adds a placeholder record when a new light is to be installed and then updates the light model and wattage details once the light installation is completed. However, the most recent zero lamp wattage record in the database has a creation date of October 2021 indicating the process to monitor these light installations and make the necessary database updates is not robust.

The accuracy of the recorded wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
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Audit Ref: 2.4 With: Clause 11(2)(c) and (d) of Schedule 15.3 From: 01-Sep-22 To: 28-Feb-23	LED make and model details are not recorded in the database. 85 items of load do not have information populated in the light model fields, and 32 of these also have no information populated in the "If Other Light Type Pls Specify" field. 29 poles had a zero-value wattage value when a non-zero value was expected. Potential impact: Unknown Actual impact: Medium Audit history: Multiple times Controls: Weak Breach risk rating: 6		
Audit risk rating	Rationale for audit risk rating		
Medium	The controls are rated as weak as wattages are not consistently populated, and there are no LED lamp makes and models recorded. The impact is assessed to be medium as the database does not have LED make and model recorded and the field audit indicates that the data is not accurate.		
Actions taken to resolve the issue		Completion date	Remedial action status
HCC has been notified of the discrepancies. Genesis relies on HCC to accurately maintain its database.		01/07/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Genesis will continue to work with the council to help them increase database accuracy.		Continuous Improvement	

2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)

Code reference

Clause 11(2A) of Schedule 15.3

Code related audit information

The retailer must ensure that each item of DUML for which it is responsible is recorded in this database.

Audit observation

The field audit was undertaken of a statistical sample of 386 items of load on 7th February 2023 & 1st March 2023. The sample was selected from five strata, as follows:

1. A-Go,
2. Gr-Kn,
3. Ku-N,
4. O-S, and
5. T-W.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
A-Go					
Anderson Grove	6	6	0	3	2x LED 22W were recorded in the database as LED 27W. 1x LED 23W was recorded in the database as LED 22W.
Awamutu Grove	17	17	0	3	1x LED 27W was recorded in the database as LED 22W. 1x LED 16W was recorded in the database as LED 22W. 1x LED 27W was recorded as 50W SON (61W) in the database.
Barraud Street	7	7	0	1	1x LED 27W was recorded in the database as LED 22W.
Becks Close	2	2	0	1	1 x LED 22W was recorded in the database as 150W SON (168W)
Castle Crescent	11	11	0	6	3x LED 23W were recorded in the database as LED 22W. 2x LED 23W were recorded as 50W SON (61W) in the database. 1x LED 16W was recorded as 50W SON (61W) in the database.
Chanel Grove	2	2	0	1	1x LED 23W was recorded in the database as LED 22W.
Cherry Blossom Grove	3	3	0	1	1x 23W LED was recorded in the database as 50W SON (61W).
Damian Grove	1	1	0	1	1x LED 23W was recorded in the database as LED 27W.
Dublin Street	5	5	0	2	2x 23W LED were recorded in the database as 50W SON (61W).
Foster Crescent	9	9	0	1	1x 50W SON (61W) was recorded in the database as LED 27W
Gr-Kn					
Hautana Street	18	18	0	10	8x LED 22W were recorded in the database as LED 23W. 1x LED 22W was recorded in the database as LED 27W.

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
					1x LED 17W was recorded in the database as LED 22W
Herbert Street	4	4	0	2	2x LED 149W were recorded in the database as LED 22W.
Holly Grove	4	4	0	1	1x LED 22W was recorded in the database as LED 23W
Hyde Street	24	24	0	5	2x 50W SON (61W) were recorded in the database as LED 23W. 1x LED 27W was recorded in the database as LED 23W. 2x LED 22W were recorded in the database as LED 23W.
James Grove	11	11	0	3	2x 23W LED were recorded in the database as 50W SON (61W). 1x LED 27W was recorded in the database as LED 23W.
Kapuranga Grove	3	3	0	2	1x LED 23W was recorded in the database as LED 22W. 1x LED 27W was recorded in the database as LED 22W.
Kawatiri Grove	6	6	0	2	2x LED 23W were recorded in the database as LED 22W.
Kelso Grove	12	12	0	4	2x 22W LED were recorded in the database as 50W SON (61W). 1x LED 22W was recorded in the database as LED 23W. 1x LED 27W was recorded in the database as LED 23W.
Ku-N					
Leighton Avenue	17	17	0	3	2x LED 23Ws were recorded in the database as 50W SON (61W). 1x LED 23W was recorded in the database as LED 27W.
Manuka Terrace	4	4	0	4	1x LED 23W was recorded in the database as LED 27W. 1x LED 22W was recorded in the database as LED 27W.

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
					1x 23W LED was recorded in the database as 50W SON (61W). 1x 22W LED was recorded in the database as 50W SON (61W).
McKenzie Ave	6	6	0	1	1x 149W LED was recorded in the database as 250W SON (278W).
McKillop Street	14	14	0	1	1x 22W LED was recorded in the database as 50W SON (61W).
Mimihau Grove	4	4	0	2	1x 23W LED was recorded in the database as 50W SON (61W). 1x LED 22W was recorded in the database as LED 23W.
Mulberry Street	29	29	0	7	1x 50W SON (61W) was recorded in the database as LED 22W. 2x 23W LED were recorded in the database as 50W SON (61W). 1x LED 23W was recorded in the database as LED 22W. 3x 149W LED were recorded in the database as 150W SON (168W).
O-S					
Okura Grove	2	2	0	1	1x LED 23W was recorded in the database as LED 22W.
Orr Crescent	11	11	0	2	1x 16W LED was recorded in the database as 50W SON (61W). 1x LED 27W was recorded in the database as LED 23W.
Pilmuir Street	18	18	0	3	2x LED 23W were recorded in the database as LED 22W. 1x LED 27W was recorded in the database as LED 23W.
Plunket Avenue	18	18	0	4	1x LED 23W was recorded in the database as LED 22W. 1x 149W LED was recorded in the database as LED 23W. 1x 149W LED was recorded in the database as 150W SON (168W).

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
					1x 149W LED was recorded in the database as 250W SON (278W).
T-W					
Taine Street	29	28	-3	4	1x LED 12.5W PED Beacon not found in the field. 1x twin 48W (96W) LED not found in the field. 4x twin 48W (96W) LED were recorded in the database as LED 166W.
Thirlmere Street	10	10	0	1	1x 23W LED was recorded in the database as 50W SON (61W).
Tirangi Road	7	7	0	1	1x LED 22W was recorded in the database as 50W SON (61W).
Toop Street	7	7	3	3	4x 200w LED floodlights were recorded in the database as 1x 200W. 2x 149W LED were recorded in the database as LED 22W. 1x 149W LED was recorded in the database as LED 23W.
Tyndall Street	9	9	0	6	2x LED 27W were recorded in the database as LED 22W. 2x LED 22W were recorded in the database as LED 23W. 2x LED 27W were recorded in the database as LED 23W.
Wai-Iti Crescent	20	20	0	3	2x LED 22W were recorded in the database as LED 23W. 1x LED 23W was recorded in the database as LED 27W.
Wright Street	16	16	0	8	4x 23W LED were recorded in the database as 50W SON (61W). 3x LED 22W were recorded in the database as LED 23W. 1x LED 27W was recorded in the database as LED 22W
Grand Total	386	386	6 (+3-3)	103	

This clause relates to lights in the field that are not recorded in the database. The audit found three additional lights in the field. Database accuracy is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11(2)(c) and (d) of Schedule 15.3 From: 01-Sep-22 To: 28-Feb-23	Three additional lights found in the field. Potential impact: Low Actual impact: Low Audit history: Once Controls: Weak Breach risk rating: 3		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are rated as weak as process to track changes is not capturing all changes made in the field. The impact is assessed to be low as there were only three additional lamps found in the sample checked.		
Actions taken to resolve the issue		Completion date	Remedial action status
Genesis has reviewed the auditors finding and have advised HCC of the discrepancy with the intent that HCC makes every effort to ensure the exceptions are rectified.		01/07/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Genesis will continue to work with the council to help them increase database accuracy.		Continuous Improvement	

2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

The DUMML database must track additions and removals in a manner that allows the total load (in kW) to be retrospectively derived for any given day.

Audit observation

The process for tracking of changes in the database was examined.

Audit commentary

The database functionality achieves compliance with the code.

The change management process and the compliance of the database reporting provided to Genesis is detailed in **sections 3.1** and **3.2**.

Audit outcome

Compliant

2.7. Audit trail (Clause 11(4) of Schedule 15.3)

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

The DUML database must incorporate an audit trail of all additions and changes that identify:

- *the before and after values for changes*
- *the date and time of the change or addition*
- *the person who made the addition or change to the database.*

Audit observation

The database was checked for audit trails.

Audit commentary

The database has a complete audit trail, which was viewed during the audit.

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

3.1. Database accuracy (Clause 15.2 and 15.37B(b))

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

Audit must verify that the information recorded in the retailer's DUML database is complete and accurate.

Audit observation

Genesis' submissions are based on a monthly extract from the database. A database extract was provided for 7th February 2023, and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Hutt City Council Street Lights
Strata	<p>The database contains the HCC items of load for DUML ICPs in the Hutt region.</p> <p>The processes for the management of all HCC items of load are the same, but I decided to place the items of load into five similar sized strata based on road name:</p> <ol style="list-style-type: none"> 1. A-Go, 2. Gr-Kn, 3. Ku-N, 4. O-S, and 5. T-Z.
Area units	I created a pivot table of the roads, and I used a random number generator in a spreadsheet to select a total of 46 sub-units.
Total items of load	386 items of load were checked, making up approximately 2% of the load recorded in the database.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority against the database or in the case of LED lights against the LED light specification.

The change management process and timeliness of database updates was evaluated.

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 386 items of load. The "database auditing tool" was used to analyse the results, which are shown in the table below.

Result	Percentage	Comments
The point estimate of R	96.1	Wattage from survey is lower than the database wattage by 3.9%
R _L	88.6	

Result	Percentage	Comments
R _H	109.9	With a 95% level of confidence, it can be concluded that the error could be between -11.4% and +9.9%

These results were categorised in accordance with the “Distributed Unmetered Load Statistical Sampling Audit Guideline”, effective from 1 February 2019 and the table below shows that Scenario C (detailed below) is the best fit.

The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 11.4% lower and 9.9% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than ±5.0%.

- In absolute terms the installed capacity is estimated to be 41 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 120 kW lower to 104 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 176,200 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 513,000 p.a. lower to 445,100 kWh p.a. higher than the database indicates.

Scenario	Description
A – Good accuracy, good precision	<p>This scenario applies if:</p> <p>(a) R_H is less than 1.05; and</p> <p>(b) R_L is greater than 0.95</p> <p>The conclusion from this scenario is that:</p> <p>(a) the best available estimate indicates that the database is accurate within +/- 5 %; and</p> <p>(b) this is the best outcome.</p>
B – Poor accuracy, demonstrated with statistical significance	<p>This scenario applies if:</p> <p>(a) the point estimate of R is less than 0.95 or greater than 1.05</p> <p>(b) as a result, either R_L is less than 0.95 or R_H is greater than 1.05.</p> <p>There is evidence to support this finding. In statistical terms, the inaccuracy is statistically significant at the 95% level</p>
C – Poor precision	<p>This scenario applies if:</p> <p>(a) the point estimate of R is between 0.95 and 1.05</p> <p>(b) R_L is less than 0.95 and/or R_H is greater than 1.05</p> <p>The conclusion from this scenario is that the best available estimate is not precise enough to conclude that the database is accurate within +/- 5 %</p>

Light description and capacity accuracy

The database contains six light model fields to record each light model connected to the pole. I checked the lamp and gear wattages against the light model(s) installed and found:

- LED light models are generally recorded with a light model of “LED XXXW – LED”, and no lamp make, or model is recorded, which makes it difficult to determine whether the correct wattage is being applied,
- where more than one light model field was populated, the lamp, gear and total wattage was expected to match the combined wattage for all light models recorded but I found that in most cases the wattages reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models,
- where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage,
- 85 poles did not have any light model information populated in any of the six light model fields:
 - 53 of these had some information populated in the “If Other Light Type Pls Specify” field, and I confirmed that 42 had a wattage consistent with that description,
 - 35 had insufficient information to confirm the correct wattages,
- all 6,911 poles had a lamp wattage, gear wattage and total wattage populated; no poles had a blank lamp or gear wattage, and
- 29 poles had a zero-lamp wattage, Hutt City Council adds a placeholder record when a new light is to be installed and then updates the light model and wattage details once the light installation is completed, however, the most recent zero lamp wattage record in the database has a creation date of October 2021 indicating the process to monitor these light installations and make the necessary database updates is not robust.

Power summary monthly report

Genesis advised that submission differences sometimes occur where database information is received late from Hutt City Council in the form of a ‘Power Summary Report’. However, the differences involved in both overall lamp counts (14,919 DUMML DB vs 14,448 Power Summary report used by Genesis) indicates that there may be issues with how the data is being aggregated for use in the summary report provided by Hutt City Council to Genesis. Further investigation identified that the power summary monthly report provided to Genesis Energy is missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up. The annual impact of this mapping issue was assessed to be an under submission of 56,683 kWh

ICP number accuracy

As recorded in **section 2.2**, all items of load have a valid ICP number recorded including 44 items of load totalling 2,561 W that were recorded with “Properties UrbanPlus” in the ICP number field in the last audit. These lights belong to an associated council organisation and were previously being excluded from submission data. The monthly database summary has been redesigned since the last audit as part of a transition of responsibility for the database between Hutt City Council personnel. The result of this redesign means these “Properties UrbanPlus” are currently being included in submission.

The redesign has also meant the Private lights and lights which are the responsibility of the Greater Wellington Regional Council, are also being including in the Hutt City Council monthly database extract to Genesis Energy.

The Hutt City Council is now reviewing the redesigned monthly extract to ensure only the lights where Hutt City Council is responsible is included in the extract.

I recommend in **section 2.2**, that before any lights are excluded from the monthly database extract that Hutt City Council liaises with Genesis Energy and Wellington Electricity so that where additional ICPs are

required to be created and UML load transferred to these new ICPs, that this effort is conducted in a coordinated way between the affected parties.

Hutt City Council has previously advised that Properties UrbanPlus belong to an associated council organisation. I have repeated the previous audit recommendation to create a separate database and ICPs to reconcile this load.

HCC have advised that RAMM will allow a separate database to be created for this load. HCC intends to migrate from using the ArcGIS to RAMM as part of its programme of improvements to streetlight asset management processes. The project is still in the planning stage and is tentatively expected to be completed by 31 August 2023.

Change management process findings

New connection, fault and maintenance work is largely completed by Fulton Hogan, with some work completed by McKay's and City Electricians as subcontractors. Commercial Signals manage festive lights, completed some more complex work and confirm new streetlight connections match to the as-builts. All the contractors record the details of the work completed in the field, which is manually input into the database by their office staff on receipt. HCC completes audits to spot check data that the contractors have entered and monitors activity to ensure that updates are occurring.

The accuracy of the field audit indicates this process is not working as expected with a high number of wattage discrepancies found. The previous audit recommended that a 100% field audit be completed, and this is underway as part of the LED upgrade process.

The new connection process was reviewed:

- a plan is prepared by the developer and approved by HCC,
- the installation is completed,
- the developer or their electrician provides information on the installations including records of inspection and certificates of compliance, and the database is updated,
- HCC completes a form and notifies Genesis that livening is required using the as-built information that has been checked in the field, and
- Genesis requests livening from Wellington Electricity.

This can result in some lights being included in the monthly report before they are livened. I did not come across any instances of this.

There is also a risk that some private lanes might be included in the list of lights provided to Hutt City Council, but these private lanes and streets will not be included in the list of streets to be vested to the council. There is no mechanism between Hutt City Council and Genesis Energy to capture these private lanes and streets from the developers list and exclude them from the livening request to Wellington Electricity until a party is identified to take responsibility for these lights. I recommend that Genesis Energy and Hutt City Council review their new connection process to ensure that the livening request to Wellington Electricity only includes streets that the Hutt City Council is to take responsibility for.

Description	Recommendation	Audited party comment	Remedial action
Review new connection process.	Genesis Energy and Hutt City Council to review the new connection/livening request process to ensure any private lights are not livened until a responsible party is identified for these lights.	Genesis Energy only sends a request to liven for the lights where an ICP to add the load to and ROI is provided by council. Genesis will highlight this to the council and relies on the council to add any lights to RAMM where they have requested us to send the livening request.	Identified

The ArcGIS database creates a single record for each pole and additional lights are recorded in fields labelled light 2, light 3 etc. Each record has a created date, installed date, end date, last edited date, last serviced date, lamp installation date, and pole installation date. Created date, installed date, end date and last edited date are all consistently populated. The lamp installation date is only populated for a small number of lamps. The “edited date” is automatically populated with the date the change occurred, and the “last serviced date” indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect. Because only one set of dates is recorded for each pole, where there is more than one light connected it may not reflect the correct dates for each light.

Lamp wattage, gear wattage and total wattage values are derived from the map model descriptions using a mapping table that requires maintenance outside of the database at the time the monthly snapshot is produced.

The design of the database provides a number of data integrity challenges to Hutt City Council to ensure data is complete and accurate each month.

Commercial Signals complete outage patrols in most of the Lower Hutt central business district and Jackson Street, Petone (including the HCC car park off Jackson Street) each Monday. The faults process is relied upon to identify issues with other lights.

Festive lights

Festive lights are recorded in the database against 160 poles, 10 lights have a description that enables the operating wattage to be determined and 150 festive lights do not. In all cases these festive lights are recorded as secondary models connected to poles. It was also observed during the field audit that not all festive lights are recorded in the database.

Most affected poles have 15-25 3W festive lamps fitted on a lighting harness. Commercial Signals connects the festive lights during November and disconnects during January. Hutt City Council is notified of the connection and disconnection dates, but there is not a process to communicate this to Genesis. Under submission is expected as festive lights wattages were not included in the January 2022 database extract provided to Genesis.

Description	Recommendation	Audited party comment	Remedial action
Festive lights	Complete a full stocktake of installed festive lights and confirm processes to communicate festive light wattages and on and off dates to Genesis so that they can be included in submission data when connected.	Genesis has raised this with HCC and will continue send reminders to provide on/off dates for festive lights.	Identified

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Sep-22 To: 28-Feb-23	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kWh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p> <p>Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
High	<p>The controls over the database are rated as weak as the data quality is poor and incomplete. This is reflected by the field audit results.</p> <p>The audit risk rating is high based on kWh variances identified.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status

HCC has been notified of the discrepancies. Genesis relies on HCC to accurately maintain its database. In regard to festive lights Genesis has advised Hutt CC to notify when the festive lights have been turned on/off. Genesis has advised Hutt CC that Genesis requires monthly extracts that track any changes within the month to meet the DUML regulations and track changes at a daily level.	01/07/2023	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
Genesis will send monthly reminders to HCC to provide the dataset. Genesis will continue to work with the council to help them increase database accuracy.	Continuous Improvement	

3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

- *volume information for the DUML is being calculated accurately,*
- *profiles for DUML have been correctly applied.*

Audit observation

The submission was checked for accuracy for the month the database extract was supplied. This included:

- checking the registry to confirm that the ICP has the correct profile and submission flag, and
- checking the database extract combined with the on hours against the submitted figure to confirm accuracy.

Audit commentary

Genesis reconciles the DUML load as NHH using the CST profile, and the correct profiles and submission flags are recorded on the registry.

- Wattages are derived from an extract from the ArcGIS database provided by HCC. Database extracts are intended to be supplied to Genesis monthly but have sometimes been provided every two months and have not consistently included wattage information.
- The best available estimate indicates that the database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates as discussed in **section 3.1**.
- On and off times are derived from data logger information.
- I recalculated the submissions for November 2022 using the data logger and the database information. I confirmed that the calculation method was correct.
- I compared the submitted volume for November 2022 to a manual calculation of the watt of connected load from the November 2022 database extract and the operation hours of the

streetlights from the streetlight logger for November 2022 and found some differences as detailed in the table below:

ICP	Nov 2022 GENE kW	Burn hours	Nov 2022 kWh submitted	DUML DB kW	Calculated kWh	Difference
0001256864UN8C4	415.1942	284.73	118,217.4	419.781	119,524.36	-1,306.96
0001256868UNBDA	97.897	284.73	27,874.2	97.999	27,903.26	-29.06
0001255305UNA9F	221.3655	284.73	63,029.1	223.360	63,597.44	-568.34
0001256863UN50E	364.612	284.73	10,3815.3	374.866	106,735.74	-2,920.44

- Genesis advised that submission differences sometimes occur where database information is received late. However, the differences involved in both overall lamp counts (14,919 DUML DB vs 14,448 Power Summary report used by Genesis indicates that there may be issues with how the data is being aggregated for use in the summary report provided by Hutt City Council to Genesis.

Examination of the database found:

Issue	Estimated volume information impact (annual kWh)
LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.	Unknown impact
Where more than one light model field was populated, the lamp, gear and total wattage was expected to match the combined wattage for all light models recorded. I found that in most cases the wattages reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.	Unknown impact
Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage for all lights connected to the listed pole.	Unknown impact
85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.	Over submission of 1,926.2 kWh for the eight items of load where wattages were inconsistent with the "If Other Light Type Pls Specify" field. Unknown impact for the 35 items of load which had insufficient information to confirm the correct load.
The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up.	Under submission of 56,683 kWh.

Issue	Estimated volume information impact (annual kWh)
<p>Festive lights are recorded in the database against 160 poles, 10 lights have a description that enables the operating wattage to be determined and 150 festive lights do not. In all cases these festive lights are recorded as secondary models connected to poles. It was also observed during the field audit that not all festive lights are recorded in the database.</p> <p>Most affected poles have 15-25 3W festive lamps fitted on a lighting harness. Commercial Signals connects the festive lights during November and disconnects during January.</p> <p>HCC is notified of the connection and disconnection dates, but there is not a process to communicate this to Genesis.</p>	<p>Unknown impact, but under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p>
<p>29 poles had a zero-lamp wattage, Hutt City Council adds a placeholder record when a new light is to be installed and then updates the light model and wattage details once the light installation is completed. However, the most recent zero lamp wattage record in the database has a creation date of October 2021 indicating the process to monitor these light installations and make the necessary database updates is not robust</p>	<p>Unknown impact</p>

The above discrepancies are discussed further in **sections 2.1, 2.4 and 3.1**.

As recorded in the last three audits, a monthly snapshot is not sufficient to calculate submission from, and the code requires that to calculate the correct monthly load the monthly wattage report must:

- take into account when each item of load was physically installed or removed, and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant. Genesis completes revision submissions where corrections are required and is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The ArcGIS database create a single record for each pole and additional lights are recorded in fields labelled light 2, light 3 etc. Each record has a created date, installed date, end date, last edited date, last serviced date, lamp installation date, and pole installation date. Created date, installed date, end date and last edited date are all consistently populated. The lamp installation date is only populated for a small number of lamps. The “edited date” is automatically populated with the date the change occurred, and the “last serviced date” indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect. Because only one set of dates is recorded for each pole, where there is more than one light connected it may not reflect the correct dates for each light.

Lamp wattage, gear wattage and total wattage values are derived from the map model descriptions using a mapping table that requires maintenance outside of the database at the time the monthly snapshot is produced.

The design of the database provides a number of data integrity challenges to Hutt City Council to ensure data is complete and accurate each month.

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c)</p> <p>From: 01-Sep-22 To: 28-Feb-23</p>	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p> <p>Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>Potential impact: High Actual impact: Unknown Audit history: Multiple times Controls: Weak Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
High	<p>The controls over the database are rated as weak as the data quality is poor and incomplete. This is reflected by the field audit results.</p> <p>The audit risk rating is high based on kWh variances identified.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status

<p>HCC has been notified of the discrepancies. Genesis relies on HCC to accurately maintain its database.</p> <p>In regard to festive lights Genesis has advised Hutt CC to notify when the festive lights have been turned on/off.</p> <p>Genesis has advised Hutt CC that Genesis requires monthly extracts that track any changes within the month to meet the DUML regulations and track changes at a daily level.</p>	01/07/2023	Identified
<p>Preventative actions taken to ensure no further issues will occur</p>	<p>Completion date</p>	
<p>Genesis will send monthly reminders to HCC to provide the dataset. Genesis will continue to work with the council to help them increase database accuracy.</p>	<p>Continuous Improvement</p>	

CONCLUSION

As reported in the last audit, the streetlight information is recorded in an ArcGIS database managed by HCC. There is a separate RAMM database and HCC intends to migrate from ArcGIS to RAMM as part of its programme of improvements to the streetlight asset management processes. The project remains in the planning stage and is still tentatively expected to be completed by 31 August 2023.

New connection, fault and maintenance work is largely completed by Fulton Hogan, with some work completed by McKay's and City Electricians as subcontractors. Commercial Signals are responsible for festive lights, outage patrols, some complex work, and confirming new streetlight connections match to the as-builts. All of the contractors record the details of the work completed in the field, which is manually input into the database by their office staff on receipt. HCC completes audits to spot check data that the contractors have entered and monitors activity to ensure that updates are occurring.

Genesis reconciles the DUMML load as NHH using the CST profile, with wattages derived from the most recent database extract provided by HCC and on and off times derived from data logger information.

The power summary monthly report provided to Genesis Energy is missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh per annum.

A field audit was conducted of a statistical sample of 386 items of load and results were analysed using the "database auditing tool". I found that the database had poor accuracy, demonstrated with statistical significance. The true wattage (installed in the field) could be between 11.4% lower and 9.9% higher than the wattage recorded in the DUMML database. This is outside of the allowable +/- 5% threshold. There is a 95% level of confidence that the annual consumption is between 513,000 kWh p.a. lower to 445,100 kWh p.a. higher than the database indicates.

The audit found five non-compliances and four recommendations were made.

The future risk rating of 36 indicates that the next audit be completed in three months. I recommend that the next audit be in no more than six months' time. This should allow Hutt City Council sufficient time to complete the proposed migration of the DUMML database from ArcGIS to RAMM and for the recommended actions to be in progress to improve the overall database accuracy.

PARTICIPANT RESPONSE